Self-similar solutions for active scalar equations with higher-order couplings in Fourier-Besov-Morrey spaces

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In this work we study a family of dissipative active scalar equation with velocity elds cou-pled via multiplier operators that can be of high-order. We consider sub-critical values for the fractional di usion and prove global well-posedness of solutions with small initial data belonging to a framework based on Fourier transform, namely Fourier-Besov-Morrey spaces. Self-similar solutions are obtained depending on the homogeneity of the initial data and couplings. Also, we show that solutions are asymptotically self-similar at in nity. Our results can be applied in a uni ed way for a number of active scalar PDEs like 1D models on dislocation dynamics in crystals, Burguer's equations, 2D vorticity equation, 2D generalized SQG, 3D magneto-geostrophic equations, among others.